AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application:

1. (currently amended) A catalyst regenerator comprising:

a ~~continuous~~ reactor vessel having a first section with a first width, ~~that is coupled to a~~ wherein an outwardly tapered transition portion is coupled to the first section to so increase the first width, and wherein the tapered transition portion is coupled to a second section ~~via a tapered transition portion~~ having a second width;

wherein the first section is configured to receive a carbon-contaminated catalyst and to receive an oxygen-containing gas at a flow rate to allow for co-current catalyst regeneration in the first section, wherein the first section has [[a]] the first width and a first volume;

wherein the second section has [[a]] the second width and a second volume, wherein the second width is greater than the first width, and wherein the first and second widths are configured to allow substantially complete conversion of carbon from the carbon-contaminated catalyst to carbon dioxide in the first section; and

wherein the first width and first volume and the second width and second volume are configured such that at the flow rate (a) the oxygen-containing gas has a residence time in the first section effective to selectively produce carbon monoxide from the carbon-contaminated catalyst such that a ratio of carbon monoxide from the carbon-contaminated catalyst to carbon dioxide produced from the carbon monoxide is at least 9:1, (b) the oxygen-containing gas has a residence time in the second section effective to produce carbon dioxide from the carbon monoxide~~;~~ ~~and~~

~~wherein the regenerator is further configured such that the flow rate in the first section is higher than the flow rate in the second section~~.

2. (Original) The catalyst regenerator of claim 1 wherein the first section and the second section have a substantially circular horizontal cross section.

3. (Original) The catalyst regenerator of claim 2 wherein the first section has a first height H1 and a first diameter D1, wherein the second section has a second height H2 and a second diameter D2, and wherein D2:D1 is at least 2.5 and H2:H1 is at least 0.6.

4. (Original) The catalyst regenerator of claim 1 wherein the carbon-contaminated catalyst has a temperature of less than 700°F.

5. (Original) The catalyst regenerator of claim 1 wherein the first section is configured such that the carbon-contaminated catalyst is fluidized in the first section at least in part at the flow rate of the oxygen-containing gas.

6. (currently amended) The catalyst regenerator of claim 1 wherein the second section is configured such that the residence time of the oxygen-containing gas in the second section is sufficient to precipitate substantially all of the carbon-contaminated catalyst and regenerated catalyst carried over from the first section.

7. (Original) The catalyst regenerator of claim 1 wherein the second section receives a second oxygen-containing gas comprising molecular oxygen.

8. (Original) The catalyst regenerator of claim 7 wherein the oxygen-containing gas received in the first section comprises an amount of molecular oxygen that is substantially equal or less than an amount required to convert substantially all of the carbon of the carbon-contaminated catalyst to carbon monoxide in the first section.

9. (Original) The catalyst regenerator of claim 1 wherein the oxygen-containing gas in the second section has a temperature of less than 1100°F.

10. (Original) The catalyst regenerator of claim 1 wherein the carbon-contaminated catalyst is continuously provided to the first section.

11. (Original) The catalyst regenerator of claim 1 further comprising a catalyst coupled to the second section that converts carbon monoxide to carbon dioxide.

12. (currently amended) A catalyst regenerator comprising:

a ~~continuous~~ reactor vessel having a first section with a first width, ~~that is coupled to a~~ wherein an outwardly tapered transition portion is coupled to the first section to so increase the first width, and wherein the tapered transition portion is coupled to a second section ~~via a tapered transition portion~~ having a second width;

wherein the first section has a first height H1 and a first diameter D1 and wherein the second section has a second height H2 and a second diameter D2, wherein D2:D1 is at least 2.5, H2:H1 is at least 0.6;

wherein the first section is further configured to receive a carbon-contaminated catalyst and to receive an oxygen-containing gas to thereby allow for substantially complete co-current catalyst regeneration in the first section;

wherein H1, D1, H2, and D2 are configured such that carbon from a carbon-contaminated catalyst is selectively converted to carbon monoxide in the first section using an oxygen containing gas such that a ratio of the carbon monoxide from the carbon-contaminated catalyst to carbon dioxide produced from the carbon monoxide is at least 9:1, and

such that the carbon monoxide from the first section is selectively converted to carbon dioxide in the second section; and

wherein H1, D1, H2, and D2 are further configured such that a flow rate of the oxygen containing gas is higher in the first section than in the second section.

13. (currently amended) A method of regenerating a catalyst comprising:

providing a ~~continuous~~ reactor vessel having a first section with a first width, ~~that is coupled to a~~ wherein an outwardly tapered transition portion is coupled to the first section to so increase the first width, and wherein the tapered transition portion is coupled to a second section ~~via a tapered transition portion~~ having a second width, wherein the first section has a diameter that is less than a diameter of the second section;

feeding a carbon-contaminated catalyst and an oxygen-containing gas at a predetermined flow rate to the first section to co-currently regenerate substantially all of the catalyst in the first section;

wherein the first section is configured to provide a residence time of the oxygen-containing gas effective to selectively produce carbon monoxide from the carbon-contaminated catalyst such that a ratio of the carbon monoxide from the carbon-contaminated catalyst to carbon dioxide produced from the carbon monoxide is at least 9:1; and

wherein the second section is configured to provide a second residence time of the oxygen-containing gas and carbon monoxide effective to produce carbon dioxide from the carbon monoxide~~; and~~

~~wherein the flow rate in the first section is higher than in the second section~~.

14. (Original) The method of claim 13 wherein the first section has a first height H1 and a first diameter D1, wherein the second section has a second height H2 and a second diameter D2, and wherein D2:D1 is at least 2.5 and H2:H1 is at least 0.6.

15. (Original) The method of claim 13 further comprising operating the first section at a temperature of less than 700 °F and operating the second section at a temperature of less than 1100 °F.

16. (Original) The method of claim 13 wherein the second residence time of the oxygen-containing gas and carbon monoxide in the second section is sufficient to precipitate substantially all of the carbon-contaminated catalyst carried over from the first section.

17. (Original) The method of claim 13 further comprising feeding a second oxygen-containing gas comprising molecular oxygen to the second section.

18. (Original) The method of claim 13 wherein the oxygen-containing gas of the first section comprises an amount of molecular oxygen that is substantially equal or less than an amount required to convert substantially all of the carbon of the carbon-contaminated catalyst to carbon monoxide in the first section.

19. (Original) The method of claim 13 further comprising continuously providing the first section with carbon-contaminated catalyst.

20. (Original) The method of claim 13 further comprising coupling a catalyst to the second section that converts residual carbon monoxide to carbon dioxide.